Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 15 (5): 847–850
https://doi.org/10.15560/15.5.847

PENSOFT

First record of *Sphecodina caudata* (Bremer & Grey, 1852) (Lepidoptera, Sphingidae) from Amur Oblast, with an overview of its distribution in Russia

Evgeny S. Koshkin[1], Vitaly G. Bezborodov[2]

1 Institute of Water and Ecology Problems, Far Eastern Branch of the Russian Academy of Sciences, Dikopoltsev Street 56, Khabarovsk, 680000, Russia. **2** Amur Branch of Botanical Garden-Institute, Far Eastern Branch of the Russian Academy of Sciences, 2nd km of Ignatevskoye Shosse, Blagoveshchensk, 675000, Russia.
Corresponding author: Evgeny S. Koshkin, ekos@inbox.ru

Abstract
The hawk moth *Sphecodina caudata* (Bremer & Grey, 1852) (Lepidoptera, Sphingidae) is reported in Amur Oblast for the first time. The new record, 3 km west of Kundur village, Khingan Nature Reserve, is in the extreme southeastern part of the region and 308–420 km north-west of previously known records in southern Khabarovsk Krai. An overview of the distribution records of *S. caudata* in Russia is provided.

Keywords
Distribution, new record, Russian Far East.

Academic editor: Ivan Bolotov | Received 9 August 2019 | Accepted 27 August 2019 | Published 27 September 2019

Citation: Koshkin ES, Bezborodov VG (2019) First record of *Sphecodina caudata* (Bremer & Grey, 1852) (Lepidoptera, Sphingidae) from Amur Oblast, with an overview of its distribution in Russia. Check List 15 (5): 847–850. https://doi.org/10.15560/15.5.847

Introduction

The hawk moths (Lepidoptera, Sphingidae) fauna of the Russian Far East is well studied and reliably includes 42 species (Derzhavets 1984; Tshistjakov and Beljaev 2016). Several species of this fauna were recently recorded, i.e. *Acosmeryx naga* (Moore, [1858]), *Ambulyx tobii* (Inoue, 1976), *Acherontia styx* (Westwood, 1847), and *Parum colligata* (Walker, 1856) (Beljaev 2003; Koshkin and Bezborodov 2013; Dubatolov and Yakovlev 2013; Koshkin and Kostyunin 2017). Two species, *Acosmeryx naga* and *Ambulyx tobii*, have successfully naturalized in the southern areas of the Russian Far East. Additionally, several species previously observed in Russia only in the extreme south of Primorsky Krai have significantly expanded their ranges to the north (Koshkin and Bezborodov 2013; Koshkin et al 2015). These northward range shifts can be linked to changes in climate which are expressed as an increase of the average annual surface air temperature and annual precipitation throughout the Amur Basin. The increase in spring–winter air temperatures primarily contributes to recent climate warming in the region (Novorotskii 2007). We assume that warmer weather conditions during the spring–winter period could increase the survival of hibernating pupae and lead to successful colonization of northern areas (e.g. Amur Oblast) by more southern, vagrant species.

A representative of the hawk moth genus *Sphecodina*, with two species having day-time activity, *Sphecodina caudata* (Bremer & Grey, 1852) is one of the species expanding their range in the Russian Far East. *Sphecodina caudata* inhabits East and Southeast Asia (North

Copyright *Koshkin and Bezborodov*. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Thailand), while *S. abbottii* (Swainson, 1821) is an eastern North American species. In Russia, *S. caudata* was initially observed only in the southern part of Primorsky Krai (Derzhavets 1984; Tshistjakov 2001, 2005). Later, this species was discovered in several localities in the southern part of Khabarovsk Krai (Koshkin and Yakubovich 2007; Koshkin 2013; Dubatolov et al. 2014). We report the first record of *S. caudata* from Amur Oblast and also supplement this record with an overview of the species' distribution in Russia. The new record represents the most northwestern occurrence of this species.

Methods

To compile the data set on current distribution of *Sphecodina caudata* in Russia, we included records from the body of available literature, the new record from Amur Oblast, and a comprehensive amount of collection depositories. The collections studied are as follows (the acronyms are given in parentheses): Grigory Grigoriev, St. Petersburg, Russia (GG); Evgeny Koshkin, Khabarovsk, Russia (EK); Konstantin Prokopenko, Vladivostok, Russia (KP); Vadim Golovizin, Krasnoyarsk, Russia (VG); Vitaly Bezborodov, Blagoveshchensk, Russia (VB); Anton Voronkov, Vladivostok, Rissia (AV); and Vadim Yakubovich, Khabarovsk, Russia (VY). Based on our distribution data set, we prepared the distribution map for *S. caudata* in the Russian Far East using Adobe Photoshop CS4. The image of the specimen from Amur Oblast was taken using a Sony SLT-A65 camera with a Sony FE 50mm f/2.8 macro lens.

Results

***Sphecodina caudata* (Bremer & Grey, 1852)**
Figure 1

Macroglossa caudata Bremer and Grey 1852: 62. Type locality: North China, vicinity of Pekin [Beijing].

Sphecodina caudata. Izerskii 1999: 76 (Primorsky Krai, Khasan District: Primorskii); Tshistjakov 2005: 89 (Primorsky Krai: Barabash-Levada, Rettikhovka, Gornotayezhnoye, Brovnichi, Tigrovyi, Anisimovka; Kedrovaya Pad', Ussuriisky and Lazovsky Nature Reserves); Tshistjakov 2006: 201 (Primorsky Krai: 2 km SW Barabash); Koshkin and Yakubovich 2007: 100 (Khabarovsk Krai, Vyazemsky District, Sysoevsky Utes); Omelko and Omelko 2008a: 274 (Primorsky Krai: Gornotayezhnoye, Andreevka, Golubinyi Utes); Omelko and Omelko 2008b: 423 (Primorsky Krai: Gornotayezhnoye, Andreevka, Golubinyi Utes); Tshistjakov 2009: 276 (Primorsky Krai, Lazovsky Nature Reserve: Glazkovka, Amerika cordon); Koshkin 2013: 516 (Khabarovsk Krai: Vyazemsky District, Sysoevsky Utes; Imeni Lazo District, 25 km SE Durmin); Dubatolov et al. 2014: 78 (Khabarovsk Krai, Bolshekhekhtsyrsky Nature Reserve: vicinities of Bychikha and Kazakevichevo villages, Odyr and Chirki cordons).

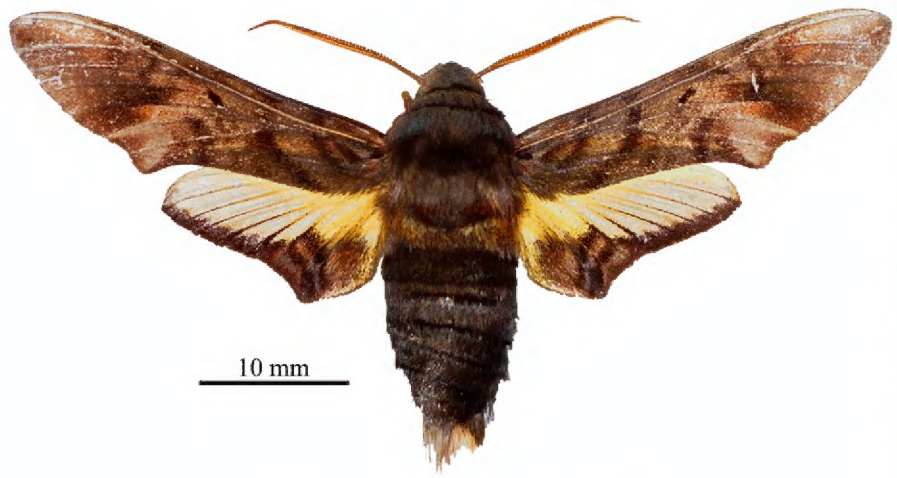
New record. Russia, Amur Oblast, Arkhara District, Khingan Nature Reserve, 3 km W of Kundur, valley of Karapcha River, Karapcha cordon (49°06′50″N, 130°43′01″E), 24.06.2019, 1 ♂, V. Bezborodov leg. (EK) (Fig. 1).

A male of *S. caudata* (wingspan 59 mm, forewing length 27 mm) was collected from the southeastern part of Amur Oblast (Fig. 1). This specimen was recorded in a coniferous–deciduous forest patch at 6:30 pm on 24.06.2019. The male was attracted to pungent human urine on the bark of an Amur cork tree (*Phellodendron amurense*) at a height of about 50 cm above ground level. According to our observations in various habitats and the observations of Omelko and Omelko (2008a), adults are primarily active during evening and morning.

Additional material examined. Russia, Khabarovsk Krai: Imeni Lazo District, 25 km SE of Durmin, upstream of Durmin River (47°54′N, 136°02′E), 205 m, ex pupa 15.10.2011, 27.12.2011–3.01.2012, 3 ♂, 3 ♀, E. Koshkin leg. and bred (EK); Vyazemsky District, upstream of Pravyi Podkhorenok, Sysoevsky Utes rock (47°16′21″N, 135°18′08″E), 3–4.06.2006, 3 ♂, V. Yakubovich leg. (EK, VY); Primorsky Krai: Dalnerechensk District, Pozhiga, 5.06.2008, 3 ♂, V. Golovizin leg. (VG), 24.05.2014, 1 ♂, 25.05.2016, 3 ♂, K. and A. Prokopenko leg. (KP, GG); Spassk District, about 4 km SE of Kalinovka, 7.06.2019, 2 ♂, V. Bezborodov and A. Voronkov leg. (AV, VB); Chernigovka District, 4 km SE of Merkushevka, 28.07.2019, 1 late pre-pupation larva on ground, V. Bezborodov leg. (AV); Anuchino District, 26 km NW Arsenyev, eastern slopes of the Siniy Mountains, Klyuch Bolshoi River (tributary of Sinegorka River), LZU 4, 26.05.2000, 1 ♂, S. Veriga leg. (GG); Anuchino, 2 larvae, 18.07.2014, A. Voronkov leg. (AV); Novogordeevka, 23.05.2015, 9 ♂, V. Golovizin leg. (VG); environs of Arsenyev, 5.06.2008, 1 ♂ (GG); Ussuriisk District: Kamenushka, 28.05.2010, 1 ♂, S. Ivanov leg. (GG); Vladivostok District, Shamora Pass (43°12′N, 132°04′E), ex pupa: 12.2017, 2 ♀, K. and A. Prokopenko leg. and bred (KP); Vladivostok, 22.06.1975, 1 ♀, E. Beljaev leg. (GG); Shkotovo District, Anisimovka, ex pupa: 31.01.2018, 2 ♀, K. and A. Prokopenko leg. and bred (KP); Lazovsky District: Lazovsky Nature Reserve, Sokolchi, 07.1979, 1 ♂, S.V. Murzin leg. (GG).

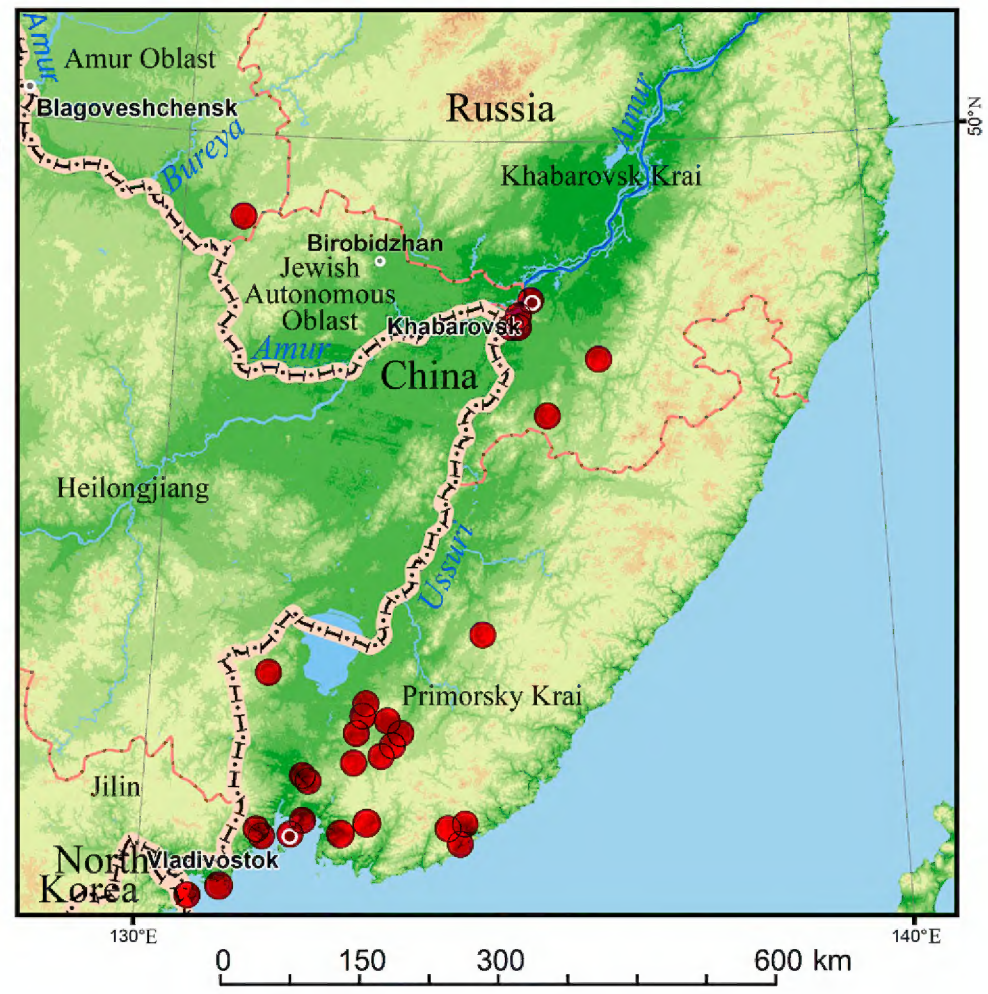
Identification. *Sphecodina caudata* can easily be distinguished from other sphingid species in the Russian Far East in its characteristic appearance. It is most similar to *S. abbottii* in external characters, but differs from that species by the even distal margin of the forewing and the characteristic pattern of the wing markings.

Distribution. In Russia this species occurs in the southeastern part of Amur Oblast (new record), southern Khabarovsk Krai, and southern and western Primorsky Krai (Fig. 2) (Derzhavets 1984; Tshistjakov 2001, 2005; Koshkin 2013; Pittaway and Kitching 2019). It also occurs in North Korea, South Korea, eastern and southern China, and northern Thailand.



Russia, Amurskaya oblast'
Arkhara district, Khingan Nature Reserve, 3 km W Kundur village, valley of Karapcha River, Karapcha cordon
49°06'50" N, 130°43'11" E,
24.06.2019, V. Bezborodov leg.

1



2

Figures 1, 2. 1. Male of *Sphecodina caudata* (dorsal view) from Amur Oblast, Russia. **2.** Distribution records of *S. caudata* in the Russian Far East.

Discussion

Until 2006, *Sphecodina caudata* was recorded from just a few localities in the southern part of Primorsky Krai. This species was noted to have a very low abundance, and it was included to the Red Data Books of the Russian Federation and Primorsky Krai. During 2006–2017, *S. caudata* significantly expanded its range northward to Khabarovsk Krai. There are several records of adults and larvae in the upper reaches of the Durmin and Pravyi Podkhorenok rivers (Koshkin and Yakubovich 2007; Koshkin 2013) and in the Bolshekhekhtsyrsky Nature Reserve and its vicinity (Dubatolov et al. 2014). In June 2017, one specimen was observed on *Syringa* flowers in Voronezhskoe Shosse, which is the northern part of the city of Khabarovsk (Alexander Batalov pers. comm.). In the Khabarovsk Krai, *S. caudata* is a rare species that is not annually observed, and it was therefore included in the new edition of the Red Data Book of Khabarovsk Krai (Government of Khabarovsk Krai 2014). Our new record from Khingan Nature Reserve is 308–420 km distant from previously known localities in Khabarovsk Krai and can be considered the most northwestern occurrence in this species' range (Fig. 2). In the Jewish Autonomous Oblast, which is situated between Khabarovsk Krai and Amur Oblast, *S. caudata* is still not recorded, probably because the hawk moth fauna of this region is poorly studied. The records from Khabarovsk Krai and Amur Oblast are outside the primary geographic range of this species. These sporadic occurrences can equally be attributed both the insufficient knowledge of the lepidopteran fauna of these regions and the continued expansion of *S. caudata* to the north triggered by climate change. Amur grape (*Vitis amurensis*), the host plant of larvae of *S. caudata*, has a broader range in the southern part of the Russian Far East compared to the distribution of this hawk moth species. Hence, availability of the larval host plant does not limit the range of *S. caudata*.

In Primorsky Krai, *S. caudata* is widespread in its southern and western areas (Fig. 2). The majority of specimens were recorded from the foothills of the Siniy Mountains and Khasan District. The vicinity of Pozhiga village (Dalnerechensk District), at which this species is rather abundant, is the most northern locality in Primorsky Krai. In our opinion, the lack of more northern records can be explained by the poor exploration of the northern areas of Primorsky Krai. We assume that *S. caudata* currently has a continuous range throughout Primorsky Krai and the southern areas of Khabarovsk Krai.

Acknowledgements

We thank Grigory Grigoriev (St Petersburg, Russia), Konstantin Prokopenko (Vladivostok, Russia), Vadim Golovizin (Krasnoyarsk, Russia), Vadim Yakubovich (Khabarovsk, Russia), and Anton Voronkov (Vladivostok, Russia) for the opportunity to study specimens of *Sphecodina caudata* from their collections. We are grateful to Alexander Batalov (Khabarovsk, Russia) for information about his record of *S. caudata* in Khabarovsk and Dr. Andrey Ostroukhov (Khabarovsk, Russia) for providing the cartographic base for the distribution map.

Authors' Contributions

ESK collected and identified part of the additional material, photographed the specimen collected from Amur Oblast, partly studied material from the collections, prepared the distribution map, and wrote the manuscript. VGB collected the specimen from Amur Oblast

described here, collected and identified part of the additional material, partly studied material from the collections. All authors read and approved the final version of the manuscript. The authors declare that they have no conflict of interest.

References

Beljaev EA (2003) *Acosmeryx naga* Moore (Lepidoptera, Sphingidae)—new species of hawkmoths for the fauna of Russia. Far Eastern Entomologist 131: 6–8.

Bremer O, Grey W (1852) Diagnoses de Lépidoptères nouveaux, trouvés par MM. Tatarinoff et Gaschkewitsch aux environs de Pekin. In: Études Entomologiques, rédigées par Victor de Motschulsky 1. Helsingfors, 58–67.

Derzhavets YA (1984) An account of the classification of the sphinx moths (Lepidoptera, Sphingidae) with a list of species of the fauna of the USSR. Entomological Review 63 (3): 604–620 [in Russian].

Dubatolov VV, Dolgikh AM, Platitsyn VS (2014) *Neothosea suigensis* (Limacodidae), *Catocala musmi* (Noctuidae) and other new findings of macromoths (Insecta, Lepidoptera, Macroheterocera) in the Bolshekhekhtsyrskii Nature Reserve and its environs in 2013. Amurian Zoological Journal 6 (1): 77–80 [in Russian].

Dubatolov VV, Yakovlev RV (2013) Discovery of *Acherontia styx* Westwood (Lepidoptera, Sphingidae) from Southern Primorye. Amurian Zoological Journal 5 (1): 39–40 [in Russian with English abstract].

Izerskii VV (1999) Bombycoid Lepidoptera (fam. Bombycidae, Endromididae, Lasiocampidae, Brachmaeidae, Saturniidae, Sphingidae) and notodontids (fam. Notodontidae) of Siberia and the Russian Far East. Gnozis, Kiev, 160 pp. [in Russian].

Koshkin ES (2013) Distribution and some bionomical features of *Sphecodina caudata* (Bremer et Grey, 1852) (Lepidoptera, Sphingidae) from Khabarovskii Krai. Euroasian Entomological Journal 12(5): 515–518 [in Russian with English abstract].

Koshkin ES, Bezborodov VG (2013) First records of hawkmoth *Ambulyx tobii* (Inoue, 1976) (Lepidoptera, Sphingidae) from the southern part of Primorsky Krai, Russia. Euroasian Entomological Journal 12 (4): 415–419 [in Russian with English abstract].

Koshkin ES, Bezborodov VG, Voronkov AA, Korshunov AV, Kostyunin AE, Prokopenko KM (2015) Distribution of the hawk moths *Clanis undulosa* Moore, 1879 and *Ambulyx tobii* (Inoue, 1976) (Lepidoptera, Sphingidae) in Russia. Far Eastern Entomologist 302: 14–17.

Koshkin ES, Kostyunin AE (2017) Paper-mulberry hawkmoth *Parum colligata* (Walker, 1856) (Lepidoptera, Sphingidae), a new species for the fauna of Russia. Far Eastern Entomologist 344: 18–20. https://doi.org/10.25221/fee.344.4

Koshkin ES, Yakubovich VS (2007) The first records of *Sphecodina caudata* (Bremer et Grey, 1852) (Lepidoptera, Sphingidae) from Khabarovskii Krai. In: Streltzov AN (Ed) Fauna of Russian Far East, vol. 6. Blagoveshchensk, 100–101 [in Russian].

Novorotskii PV (2007) Climate changes in the Amur river basin in the last 115 years. Russian Meteorology and Hydrology 32 (2): 102–109.

Omelko MM, Omelko NV (2008a) On the biology and behavior *Sphecodina caudata* Brem. et Grey (Lepidoptera, Sphingidae) in Primorye. In: Ostroshenko VV, Omelko MM, Ostrogradsky PG, Ivashchenko EA, Omelko NV (Eds) Biological investigations of the Mountain–Taiga Station, issue 11. GTS DVO RAN, Vladivostok, 273–279 [in Russian].

Omelko MM, Omelko NV (2008b) Cultivation and maintain *Sphecodina caudata* also it is *Acosmeryx naga* by the example of tree nursery mountain-taiga of station named after V.L. Komarov. In: New Developing Regions: Ecological Problems and Solution Possibilities. Proceeding of the Inter-Regional Research-to-Practice Conference, Khabarovsk (Russia), October 2008, book 2. DVO RAN, Khabarovsk, 423–425 [in Russian].

Pittaway AR, Kitching IJ (2019) Sphingidae of the Eastern Palaearctic (including Siberia, the Russian Far East, Mongolia, China, Taiwan, the Korean Peninsula and Japan). http://tpittaway.tripod.com/china/china.htm. Accessed on: 2019-07-15.

Government of Khabarovsk Krai (2014) Resolution of the Government of the Khabarovsk Krai on February 3, 2014 No 18-pr about changing the list of animals, included to the Red Data Book of the Khabarovsk Krai, approved by the resolution of the Government of the Khabarovsk Krai on October 27, 2006 No. 163-pr "On the approval of the list of plants and animals, included to the Red Data Book of the Khabarovsk Krai". https://laws.khv.gov.ru/pdf/%D0%BF%D0%BF_00018_03022014_000.pdf?v=0,6395836. Accessed on: 2019-07-17 [in Russian].

Tshistjakov YA (2001) *Sphecodina caudata* (Bremer et Grey, 1853). In: Danilov-Danilyan VI, Amirkhanov AM, Pavlov DS, Sokolov VE, et al. (Eds) Red Data Book of the Russian Federation. Animals. AST, Astrel, Moscow, 183–184 [in Russian].

Tshistjakov YA (2005) *Sphecodina caudata* (Bremer et Grey, 1852). In: Kostenko VA, Tshistjakov YA, Bogatov VV, Nechaev VA, Tiunov MP, Tiunova TM, Bersenev YI (Eds) Red Data Book of Primorsky Krai. Animals. Rare and endangered species of animals. Official edition. Apelsin, Vladivostok, 89–90 [in Russian].

Tshistjakov YA (2006) An annotated check-list of larger moths (Lepidoptera: Heterocera, except Geometridae and Noctuidae) of the Kedrovaya Pad Nature Reserve. In: Makarchenko EA, Kozhevnikov EA, Medvedeva LA, Storozhenko SY, Tiunova TM (Eds) Flora and fauna of Kedrovaya Pad Nature Reserve. Dalnauka, Vladivostok, 181–236 [in Russian].

Tshistjakov YA (2009) Superfamily Bombycoidea. In: Storozhenko SY, Sundukov YN, Lelej AS, Sidorenko VS, Proshchalykin MY, Kupianskaya AN (Eds) Insects of Lazovsky Nature Reserve. Dalnauka, Vladivostok, 273–276 [in Russian].

Tshistjakov YA, Beljaev EA (2016) Fam. Sphingidae. In: Lelej AS, Beljaev EA, Ponomarenko MG, Shabalin SA (Eds) Annotated catalogue of the insects of Russian Far East. Vol. 2. Lepidoptera. Dalnauka, Vladivostok, 320–327 [in Russian].